Cristal Standards

CRISTAL

COMPARISON 2D Code GS1/ RFID

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Version 1.0

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INTRODUCTION

We have been frequently asked by our partners why there is in our industry a preference for barcode and 2D-data matrix code technology instead of RFID codes. The following facts should provide an orientation about the limitation factors for this technology. Last but not least the RFID statement should illustrate why the more and more common RFID technology by the current state of development cannot replace traditional barcode functionality totally in the foreseeable future.

Nevertheless there are might be specific application areas such as re-useable containers in closed loops which might be appropriate for the use of RFID technology. The Cristal Team will observe the technical development and come up with a proposal for further standardization in the Crop Industry when the time is ripe.

DEFINITION

Barcode: A barcode (also bar code) is a machine-readable representation of information format on a surface. Originally barcodes stored data in the widths and spacing's of printed parallel lines, but today they also come in patterns of dots, concentric circles, and hidden in images. Barcodes can be read by optical scanners called barcode readers or scanned from an image by special software.

Radio-Frequency Identification (RFID): Is the wireless non-contact use of radio-frequency electromagnetic fields to transfer data, for the purposes of automatically identifying and tracking tags attached to objects. The tags contain electronically stored information. Some tags are powered by and read at short ranges (a few meters) via magnetic fields (electromagnetic induction). Others use a local power source such as a battery, or else have no battery but collect energy from the interrogating EM field, and then act as a passive transponder to emit microwaves or UHF radio waves (i.e., electromagnetic radiation at high frequencies). Battery powered tags may operate at hundreds of meters. Unlike a bar code, the tag does not necessarily need to be within line of sight of the reader, and may be embedded in the tracked object.

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RFID STATEMENT/ CONCERNS

Manipulation risk - for field programmable tags which may be written with an electronic product code by the user. A tag with no inherent identity is always threatened to get manipulated.

Communication risk - because signalling between the reader and the tag is done in several different incompatible ways, depending on the frequency band used by the tag. Often more than one tag will respond to a tag reader, for example, many individual products with tags may be shipped in a common box or on a common pallet. Collision detection to allow reading of data causes high technical effort.

Storage Capacity - storage of data associated with tracking items will require more terabytes in comparison to 2D Codes.

Costs - high cost of tags (0,05 € - 35 €) and process technologies. The application technology of the tags on the product or cap will be costly. In evaluation of economic efficiency the costs of RFID have been considered in several studies as significant higher than barcode technology because of the higher infrastructure costs which could be in the majority of cases not balanced by rationalization effects.

Electromagnetic shielding - aluminium or water based products creating a sort of Faraday cage that makes transmission more difficult . Reading is might be impossible especially when dealing with multi packs. It will be very challenging to find standardized tags which are suitable for the whole packaging and product range in the Crop protection industry.

Reading rate - the successful read rates today are insufficient due to radio wave attenuation caused by the different products and packaging.

Data flooding - not every successful reading of a tag (observation) represents data useful for the purposes of the business. Event filtering is required to reduce this data inflow to a meaningful depiction of moving goods passing a threshold.

Global standardization - the frequencies used for UHF RFID in the USA are today currently incompatible with those of Europe or Japan. Furthermore, no emerging standard has yet become as universal as the barcode.

Security concerns - exist in regard to privacy over the unauthorized reading of RFID tags, as well as security concerns over server security. Unauthorized readers can use the RFID information to track the package, and so the consumer or carrier, as well as identify the contents of a package.

Electromagnetic radiation – in the chemical production environment with the potential risks e.g. in respect of explosive hazard and line controllers are not yet sufficiently explored.

Temperature exposure - currently, RFID tags are created by gluing an integrated circuit (IC) to an inlay. This poses a problem as vibration and high temperatures will loosen the connection. If the IC loses connection with the inlay, the RFID tag will no longer transmit.

Customer relationship management - RFID is today no suitable communication tool in respect to the end consumer as there is no distributed reading technology for smart phones available. Production of smart phones with NFC reading technology is very limited total opposite to smart phones with integrated cameras reading 2D codes with App technology. This might be change if electronic cash systems with smart phones will be introduced. On the other hand NFC chips might be not suitable for logistic purposes because of the very limited reading radius.